

1. Determine the range of IP addresses that is represented by the following CIDR IPv4 addresses.

a) 192.168.0.0/16

The range of IP addresses in this subnet is from

11000000.10101000.00000000.00000000 = 192.168.0.0

to

11000000.10101000.11111111.11111111 = 192.168.255.255

b) 192.168.128.0/17

The range of IP addresses in this subnet is from

11000000.10101000.10000000.00000000 = 192.168.128.0

to

11000000.10101000.11111111.11111111 = 192.168.255.255

c) 192.168.128.0/18

The range of IP addresses in this subnet is from

11000000.10101000.10000000.00000000 = 192.168.64.0

to

11000000.10101000.10111111.11111111 = 192.168.191.255

d) 192.168.128.0/8

The range of IP addresses in this subnet is from

11000000.10101000.10000000.00000000 = 192.168.128.0

to

11000000.11111111.11111111.11111111 = 192.255.255.255

2. Determine the network ID and host ID for the following CIDR IPv4 addresses.

a) IP address: 192.168.0.64, Address mask: 255.255.0.0

Network ID = 192.168.0.0

Host ID = 0.0.0.64

b) IP address: 27.78.101.154, Address mask: 255.255.255.224

Network ID = 27.78.101.0

Host ID = 0.0.0.224

c) IP address: 172.134.56.34, Address mask: 255.255.128.0

Network ID = 172.134.0.0

00111000

AND

10000000

00000000

Host ID = 0.0.56.34

d) IP address: 192.168.0.23, Address mask: 255.192.0.0

Network ID = 192.128.0.0

Host ID = 0.40.0.23

10101000 = 168

AND

11000000 = 192

10000000 = 128

3. Suggest a way to divide the network 10.128.192.0/25 into three subnets of which one subnet should be able to hold 60 hosts and the other two subnets should be able to contain 30 hosts.

$$2^{n-2} \geq 60, n = 6$$

$$32 - 26 = 6 \quad 10.128.192.0/26$$

From

$$00001010.10000000.11000000.00000000 = 10.128.192.0$$

to

$$00001010.10000000.11000000.00111111 = 10.128.192.63$$

$$2^{n-2} \geq 30, n = 5$$

$$32 - 27 = 5 \quad 10.128.192.64/27$$

From

$$00001010.10000000.11000000.01000000 = 10.128.192.64$$

to

$$00001010.10000000.11000000.01011111 = 10.128.192.95$$

$$2^{n-2} \geq 30, n = 5$$

$$32 - 27 = 5 \quad 10.128.192.96/27$$

From

$$00001010.10000000.11000000.01100000 = 10.128.192.96$$

to

$$00001010.10000000.11000000.01111111 = 10.128.192.127$$

4. The forwarding table of a router is shown below. Determine the next hop for packets received by the router with the destination IP-addresses as follows:

Destination	Mask	Next hop
128.96.39.0	255.255.255.128	A
128.96.128.0	255.255.128.0	B
128.96.192.0	255.255.192.0	C
default		D

$$a) 128.96.126.34 = 10000000.01100000.01111110.00100010$$

NEXT HOP = DEFAULT

11111111.11111111.11111111.10000000 = MASK A

11111111.11111111.11000000.00000000 = MASK C

11111111.11111111.10000000.00000000 = MASK B

AND

10000000.01100000.01111110.00100010

=

10000000.01100000.01000000.00000000 = 128.96.64.0 C

10000000.01100000.00000000.00000000 = 128.96.0.0 B

b) 128.96.130.45 = 10000000.01100000.10000010.00101101

NEXT HOP = B

11111111.11111111.11111111.10000000 = MASK A

11111111.11111111.10000000.00000000 = MASK B

11111111.11111111.11000000.00000000 = MASK C

AND

10000000.01100000.10000010.00101101

=

10000000.01100000.10000010.00000000 = 128.96.130.0 A

10000000.01100000.10000000.00000000 = 128.96.128.0 B

10000000.01100000.10000000.00000000 = 128.96.128.0 C

c) 128.96.190.23 = 10000000.01100000.10111110.00010111

NEXT HOP = B

11111111.11111111.11111111.10000000 = MASK A

11111111.11111111.10000000.00000000 = MASK B

11111111.11111111.11000000.00000000 = MASK C

AND

10000000.01100000.10111110.00010111

=

10000000.01100000.10111110.00000000 = 128.96.190.0 A

10000000.01100000.10000000.00000000 = 128.96.128.0 B

10000000.01100000.10000000.00000000 = 128.96.128.0 C

d) 128.96.200.67 = 10000000.01100000.11001000.01000011

NEXT HOP = B

11111111.11111111.11111111.10000000 = MASK A

11111111.11111111.10000000.00000000 = MASK B

11111111.11111111.11000000.00000000 = MASK C

AND

10000000.01100000.11001000.01000011

=

10000000.01100000.11001000.00000000 = 128.96.200.0 A

10000000.01100000.10000000.00000000 = 128.96.128.0 B

10000000.01100000.10000000.00000000 = 128.96.128.0 C

e) 128.97.0.12 = 10000000.01100001.00000000.00001100

NEXT HOP = DEFAULT

11111111.11111111.11111111.10000000 = MASK A

11111111.11111111.10000000.00000000 = MASK B

11111111.11111111.11000000.00000000 = MASK C

AND

10000000.01100001.00000000.00001100

=

10000000.01100001.00000000.00001100 = 128.97.0.12 A

10000000.01100001.00000000.00001100 = 128.97.0.12 B

10000000.01100001.00000000.00001100 = 128.97.0.12 C

5. Consider a router, D, with three adjacent routers, A, B, and C. Router D uses distance vector routing and has the routing table depicted below. The table shows the shortest paths from the router to its known networks. For example, the shortest path from router D to a host on network 2 is six hops.

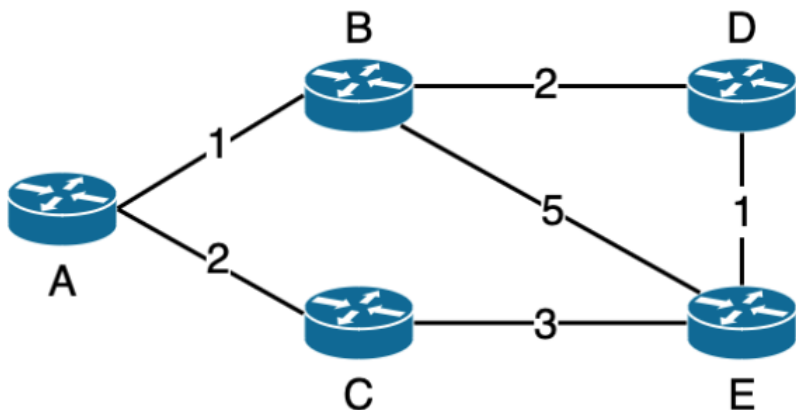
Destination	Number of Hops	Router
Network 2	6	A
Network 3	4	C
Network 4	3	A
Network 5	2	C
Network 6	3	B

The router receives the advertisement shown below from router C. Determine the routing table after it has been updated.

Destination	Number of Hops
Network 2	6
Network 3	4
Network 4	1
Network 5	2
Network 6	3

Destination	Number of Hops	Router
Network 2	6	A
Network 3	4	C
Network 4	2	C
Network 5	2	C
Network 6	3	B

6. Use Dijkstra's shortest path first algorithm to determine the least cost path from router A to the other routers in the network depicted below. Show your solution in a table such as Table 5.1 in the textbook. Also show the resulting shortest path graph.



Step	N'	D(b),p(b)	D(d),p(d)	D(c),p(c)	D(e),p(e)	
0	A	1, A	INF	2, A	INF	
1	AB	1, A	3, B		6, B	
2	ABC				5, C	
3	ABCD				4, D	
4	ABCDE		3, B	2, A		
5						

